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PRIMARY ATYPICAL PNEUMONIA OF UNKNOWN ETIOLOGY*

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IN the United States and in many other regions throughout the world from which adequate clinical reports are available, there appears to have been, during the last few years, an increased incidence of an unusual form of pneumonia, the etiology of which is unknown. It has been refractory to the methods of treatment specific for bacterial pneumonias.

Many papers on this subject have appeared in the recent medical literature. In a thorough review published in the *Journal* about two years ago, Finland and Dingle,[1] in addition to summarizing the salient clinical, laboratory, x-ray and pathologic features of the disease, emphasized certain other points. They state that this is probably not a new disease, inasmuch as a description of a closely similar malady dates back seventy-two years; that the etiology is unknown and that it is therefore unwise to assume that the etiology is a virus; that as a result the diagnosis is likely to be at best uncertain; and that most etiologic studies seem to exclude any relation of the disease to other forms of pneumonia of known virus etiology, such as ornithosis — including psittacosis — and influenza. Such studies, furthermore, show that the disease probably bears no relation to Australian or American Q fever, or to similar diseases with pneumonic lesions of rickettsial etiology. It is quite possible that several etiologic agents are involved, and that therefore so-called "virus pneumonia" is a syndrome rather than a true entity. For this reason, it becomes all the more important to analyze carefully and become thoroughly acquainted with the clinical and laboratory features as they are revealed at present.

Primary atypical pneumonia has been described in most studies as having influenzalike symptoms, often associated with evidence of mild upper respiratory infection, few physical findings, which are usually slow in making an appearance, and variable but disproportionately extensive lesions as shown by x-ray examination. Other laboratory tests have been inconsistent and disappointing. Periods of fever and disability have generally been long, making the illness of considerable economic importance.

Complications and sequelae have been described as mild and trivial. Deaths in most series have been absent or very few. In the scarce reports of cases that have come to autopsy, patchy, hemorrhagic, interstitial bronchopneumonia, associated with acute bronchitis and bronchiolitis, has been found. Areas of atelectasis and emphysema with small patches of red or gray consolidation have been described. The main microscopic feature has been a hemorrhagic or mononuclear-cell exudate in the alveoli. No inclusion bodies have been noted.

A few of these cases began to appear at the Hitchcock Hospital and the Dartmouth College Infirmary in 1938, but by far the largest number have been seen there in the last two and a half years. The naval officers of the first indoctrination school were particularly often afflicted. Many cases in children and adolescents have come from summer camps. Excellent opportunity for close observation and study has been afforded in this group of patients because all of them have been hospitalized where x-ray and laboratory facilities could be freely used. All have been under the care of five physicians who have special interests in internal medicine or pediatrics.

From January, 1942, to February, 1944, inclusive, 162 patients with a final diagnosis of primary atypical pneumonia were in the hospital. In all of them there was a confirmation of the diagnosis of some sort of pneumonia by x-ray examination. Only 122 cases, however, including 3 fatal ones, 2 of which came to autopsy, were used for analysis in this study. The 40 rejected cases were considered unsuitable for various reasons. Sputum tests were inadequate in most of them; the clinical records were incomplete in a few; and some were doubtful cases, in which the pneumonia, on more detailed consideration, seemed likely to be bacterial or to be a complication of some other disease.

One hundred and eight of these 122 patients (88 per cent) were males. This percentage is not in

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accord with that of other reports and is probably explained by the high incidence of males in the community at the time. These men were living in crowded quarters and going through training that was strenuous and unusual. The youngest patient was three years old and the oldest seventy-nine; 101 patients were in the second or third decade of life. This is in keeping with other studies, which indicate that adolescents and young adults are particularly susceptible to this malady, in spite of the fact that there was a special age selection in this college community. The age incidences by decades were 2 in the first, 60 in the second, 41 in the third, 12 in the fourth, 4 in the fifth, and 1 each in the sixth, seventh and eighth.

Many of these patients were seen in the summer and fall of 1942, and even more in the winter of 1942–1943. It is interesting to note that no patient was admitted to the hospital in May or June of either year. The period of observation is too short to permit any conclusions, but there is at least a suggestion that the seasonal incidence is quite different from that of diseases due or related to the hemolytic streptococcus. The monthly incidence (Table 1)

TABLE 1. *Monthly Incidence.*

MONTH	1942	1943	1944
January	1	17	3
February	3	6	1
March	3	10	
April	2	1	
May	0	0	
June	0	0	
July	4	1	
August	8	1	
September	11	0	
October	9	4	
November	16	3	
December	14	4	

coincides closely with that in a series reported by Murray[2] from the Department of Hygiene, Harvard University.

The period of hospitalization varied from six to sixty-seven days, with an average of nineteen days. This was due in part to the fact that the patients in military service, of which there were many, had to be well along in convalescence before they could be dismissed.

The febrile period during hospitalization varied from one day to twenty-eight days, with an average of nine days. This average is a little higher than that of cases of pneumococcal lobar pneumonia in which the patients recover spontaneously without specific serum or sulfonamide therapy.

In reviewing the symptoms of these patients (Table 2), a few striking points became evident. Cough, headache, malaise and sore throat were the most frequent symptoms, in the order named. Shaking chills were relatively infrequent. Cough was often slow in development. In most cases it was explosive, hacking and distressing; in the average case it gradually became productive of small amounts of mucopurulent sputum. Of great importance for the differential diagnosis was the complete absence of typical pleuritic pain and of "prune-juice" or rusty sputum. Numerous other complaints were offered by a few patients, as indicated in the table. Dyspnea occurred in only 2 cases, but in both there was a fatal outcome.

The term "atypical pneumonia" is particularly appropriate in relation to the question of physical findings. Most patients had few signs and a minor

TABLE 2. *Distribution of Symptoms.*

SYMPTOMS	NO. OF CASES
Cough	114
Headache	71
Malaise	58
Sore throat	50
Chills or chilliness	44
Coryza	32
Appreciable amount of sputum	27
Substernal ache (or tightness)	12
Fatigue	11
Anorexia	9
Aching eyes	8
Fever	7
Vomiting (or nausea)	5
Hoarseness	3
Dyspnea	2

proportion showed none whatever. Typical signs of consolidation were detected in less than one tenth of the patients, and came late in the course of the disease. Rales, either crepitant or musical, particularly after cough, were detected in 103 cases, but again usually appeared late. There was dullness in 34 cases, and increased vocal fremitus in 8. The breath sounds were diminished in 23 cases and otherwise changed in 11. It is worth emphasizing that no undoubted pleural friction rubs were felt or heard, nor was there ever any convincing evidence of collection of fluid in the pleural cavity. Generally speaking, most of the patients did not look particularly ill at any time, even when they had high fever. Usually, the pulse was relatively slow. Rarely was there cyanosis or abdominal distention. Herpes simplex was not reported. Slight to moderate inflammation of the nares and pharynx was apparent in most patients. The spleen was palpable for a few days in 2 cases.

The sputum was examined in every case, either by culture and typing of any pneumococci that could be isolated or by the gram-staining of smears followed by direct typing of the sputum if organisms morphologically resembling pneumococci were seen. Eighty-two cases showed many organisms in the cultures with no one of them predominating; the mixtures consisted chiefly of green-producing streptococci, staphylococci, pneumococci, *Micrococcus catarrhalis* and influenza bacilli. Hemolytic streptococci were present in 6 cases, usually in small numbers. Typable pneumococci were found in small numbers in only 4 of 77 cases examined for this purpose; these were types 3, 4, 8 and 23, respectively.

Blood cultures were done in 55 cases, and were reported as sterile in all but 1, in which contamination was suspected.

The white-cell counts ranged from 3000 to 23,000. The average count was higher during the latter part of the febrile period than at the beginning of the illness or at the end of the period of hospitalization. The percentage of polymorphonuclear leukocytes averaged 77, and in most of the severely ill patients there was an increase in immature forms — in 1 case to 35 per cent.

Sulfonamides were given as a therapeutic and diagnostic test in 63 cases in adequate dosage, as judged by blood-level determinations, without any perceptible beneficial effect on the symptoms, fever or time of hospitalization. Fifty-eight of these patients received sulfadiazine, 4 sulfathiazole, and 1 sulfamerazine.

Complications and associated diseases occurring during the convalescent period were relatively few and mild. Sinusitis developed in 4 cases. Otitis media, chiefly catarrhal, occurred in 5 cases, and in all of them was successfully treated by x-ray therapy and other conservative measures. One patient — a child — with the symptoms and signs of meningitis had increased cells in the spinal fluid, chiefly lymphocytes, but no organisms could be isolated by smears or culture, and the clinical condition improved rapidly. There was mild jaundice in 1 case, and measles in 1.

Bronchiectasis as a late complication was proved by a lipiodol bronchogram in 1 case and was suspected in a second. Follow-up study of the latter case proved impossible because the patient was transferred to a Navy hospital.

As stated previously, the diagnosis of pneumonia was confirmed by x-ray examination in all cases. The right lung was involved in 54 cases, the left in 44, and both lungs in 24. The site of involvement was the lower lung field in 90 cases, — particularly at the cardiophrenic angle, — the middle lung field in 29, and the upper lung field in 13. The entire lung field was involved in 5 cases. Patchy areas of infiltration with indistinct borders were considered the most typical picture, but several cases of distinctly lobar consolidation were seen. Accentuation of the lung markings, giving a streaked appearance of the involved area, was more pronounced than it is in most cases of bacterial pneumonia. A few of the x-ray films, taken separately and without regard for follow-up study, could easily have been interpreted as indicating pulmonary tuberculosis. Many cases showed the most extensive changes when the general condition of the patients had been improved for several days.

In addition to providing bed rest, good nursing care and adequate intake of fluids and salt to combat unusual loss from sweating, which was often excessive, the main efforts in treatment were directed toward relief of the most annoying symptoms. Inhalations of steam, expectorants containing iodine, and codeine afforded the best relief from cough, especially in the early stages. Salicylates, with or without codeine, gave fair relief from headaches. Hot gargles or irrigations of saline or weak perborate solutions were frequently used for sore throats. Two of the 4 patients with sinusitis were successfully treated by the usual simple measures, but the other two required displacement procedures. Administration of increased concentrations of oxygen was rarely necessary; its use was disappointing in the patients who needed it most — namely, those with dyspnea and cyanosis. There appears to be no specific therapy for atypical pneumonia. Favorable reports of the use of x-ray treatment and of blood transfusions from convalescent patients have appeared, but we have had no experience with these measures.

The three fatal cases require special consideration, and are described in the following reports.

Case 1. C. T. B. (D.H.H. 5587), a 19-year-old college student, entered the infirmary on March 21, 1942, with a 24-hour history of chilliness, cough, sore throat, malaise and discomfort in the midchest anteriorly. He had been dismissed from the infirmary 8 days previously, after a stay of 17 days, having made a good recovery from infectious mononucleosis, which was typical from both clinical and laboratory standpoints. The rest of the history was not remarkable.

Physical examination soon after admission showed few signs in the chest, but x-ray examination of the chest on the day of admission showed irregular mottling in the right base. Dyspnea, although not apparent in the first 3 days, gradually became more distressing until death 10 days after entry. This was associated with cyanosis and was not relieved satisfactorily by an oxygen tent that was used continuously for the last 7 days of the illness.

The white-cell count varied from 6000 to 12,000, with 37 to 85 per cent polymorphonuclear leukocytes. During the last few days the percentage of immature cells increased to 31 per cent. The sputum showed mixtures of organisms but no hemolytic streptococci or typable pneumococci. Two blood cultures showed no growth.

Sulfadiazine given in adequate doses for the first 3 days was ineffective. Two additional x-ray examinations showed increased consolidation in the base of the right lung and a spreading lesion in the left hilar region. Dr. Donald S. King, of Boston, who saw the patient in consultation 2 days before the fatal outcome, agreed with the diagnosis and therapy and suggested that the poor response was possibly due to the blood changes resulting from infectious mononucleosis. Death was preceded for 4 days by an agitated delirium. Permission for autopsy could not be obtained.

Case 2. E. C. D. (A 27,848), a 79-year-old retired printer, entered the hospital on November 3, 1942, with a 3-day history of cough and chills. He had made a good recovery from pneumonia 8 months previously. Otherwise the past history was irrelevant.

In addition to a clouded mental state and a distended, tympanitic abdomen, examination revealed labored breathing and patchy signs of consolidation in both lungs, confirmed by x-ray examinations. There was no improvement with sulfadiazine. The respirations became more rapid and labored in spite of the use of an oxygen tent, cyanosis appeared and became more marked, and the patient died 6 days after admission.

The white-cell count varied from 6000 to 9000, and a single differential count showed 81 per cent polymorphonuclear leukocytes. A blood culture was sterile, and only untypable pneumococci were present in the sputum.

Autopsy. The main findings were extensive, patchy areas of gray and red consolidation in both lungs, much frothy, grayred fluid and purulent material exuding from the bronchi, 1000 cc. of clear fluid in each pleural cavity, dilatation of the heart and moderate portal cirrhosis of the liver. Microscopically, the lungs showed scattered areas in which the alveoli were filled with pale, pink material; other areas contained

polymorphonuclear leukocytes and large, pigment-filled macrophages. The pathologists considered these findings consistent with virus pneumonia.

CASE 3. H. B. (A 330), a 38-year-old man, was admitted to the hospital on December 22, 1942. He had suffered from asthma for a long time and was an alcohol addict. For 7 days before entry he had complained of chills, malaise, headache, productive cough and dyspnea. Sulfadiazine had been given before admission, without improvement.

Physical examination showed euphoria, dyspnea, rapid respirations, widely scattered rales and signs suggesting consolidation at both bases— confirmed by x-ray examination. The patient's condition deteriorated gradually in spite of oxygen therapy and other supportive measures, and he died 8 days after admission following a 3-day period of coma.

The white-cell count increased from 7000 to 14,000, with 75 to 94 per cent polymorphonuclear leukocytes and 22 per cent immature forms. The sputum showed a mixture of organisms, including untypable pneumococci. No blood culture was done.

Autopsy. There were patchy areas of consolidation in both lungs, much gray-green, tenacious material in the bronchi, enlargement of the hilar lymph nodes and punctate red areas in the white matter of the cerebrum, internal capsule and the middle and superior cerebellar peduncles. Histologically, all regions of the lung revealed marked congestion of the alveolar capillaries. Some alveoli were filled with pink, amorphous material and others had interlacing strands of fibrin. The most characteristic appearance was that of masses of large macrophages filling the alveoli. Areas of necrosis were frequent. In some sections fibroblasts were growing into the alveolar exudate. Other findings were acute hemorrhagic encephalitis and petechial hemorrhages of the kidneys.

SUMMARY

Primary atypical pneumonia is discussed, particularly in the light of experience with 122 closely observed cases in a twenty-six-month period.

Certain points in differential diagnosis are emphasized, with special reference to symptoms, signs, and x-ray findings.

A case with bronchiectasis as a late complication is reported.

The clinical features of 3 fatal cases and the pathologic findings of 2 autopsied cases are described in detail.

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DISCUSSION

DR. R. C. BATT, Berlin: I have had 2 cases of atypical pneumonia in the last year, and one of them was mistakenly diagnosed as tuberculosis, without adequate findings. It is extremely important to take roentgenograms of the chest, but it is also important not to lose track of the clinical side of the picture. In the case just mentioned there was involvement of the right upper lobe and a suspicion of cavities. It is impossible to distinguish by x-ray examination between atypical pneumonia and tuberculosis, but this differentiation is very important, and Dr. Gundersen has shown how to make it.

I should like to know whether Dr. Gundersen considers night sweats typical of this disease.

DR. R. W. ROBINSON, Laconia: I should like to ask Dr. Gundersen whether he has come across a complication such as we have had in 3 cases that were diagnosed as influenzal infection. For some weeks before admission to the hospital, and at that time also, all had symptoms of pleuritic pain. X-ray examination showed what appeared to be massive fluid, — in 2 cases on both sides of the chest and in 1 on one side, — but tapping failed to produce fluid. Six weeks later in all 3 cases there was evidence of a localized empyema, which was opened. The organism in each case was a staphylococcus. All the patients ran a clinical course that was identical with that of Dr. Gundersen's patients. The blood pictures were also identical; that is, the white-cell count was never above 9500.

I am wondering whether pleuritic infection is a frequent complication of atypical pneumonia.

DR. C. L. SMART, Laconia: What does Dr. Gundersen think of x-ray treatment in this type of pneumonia?

DR. GUNDERSEN: In answer to Dr. Batt's question about night sweats, I have no figures for this series, but I am sure they were extremely frequent, and they are hard to handle. For this reason, many physicians are opposed to using salicylates for this disease, because they simply make the situation worse. Of course, the sweats occurred irregularly in many of these patients, coming both during the day and at night. As shown by one of the clinical charts, the fever is most irregular, dropping at any time of the day or night.

I have come across reports of pleurisy and empyema as a complication of this disease, but have not been much impressed with them, because these complications have always been due to pyogenic invaders that have been considered secondary to the atypical pneumonia. In a recent report of some 700 cases (Owen, C. M. Primary atypical pneumonia: analysis of 738 cases occurring during 1942 at Scott Field, Illinois. *Arch. Int. Med.* **73**:217-231, 1944), a small percentage of patients with fluid, mostly sterile, was mentioned.

In answer to Dr. Smart's question about x-ray therapy, he may have in mind Dr. Oppenheimer's experience. I have studied Dr. Oppenheimer's report, and for all I know this may be a valuable method of treatment. We have had no experience with it. Certainly Dr. Oppenheimer's reported results suggest benefit, particularly if x-ray treatment was used in the first week or two weeks, and particularly if very small doses were given. I believe, however, that any form of therapy is extremely difficult to evaluate in a disease of this sort, when one cannot even be sure that he is dealing with a clinical entity. There may be many etiologic factors or agents that are responsible for this picture.

NATIVE MEDICAL PRACTICES IN THE SOUTHWEST PACIFIC

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BOSTON

THE small atolls of the Gilbert and Ellice Islands are practically the only remaining places in the South Seas where the grass skirt and the uncovered breast have not come under the white man's ban. Baths are frequent and the natives are clean. It is refreshing to get away from the usual greasy, dirty, ragged Pacific "Mother Hubbard," with its long sleeves and high neck, so out of place in a steaming climate.

In the Pacific was once the most perfect quarantine against disease ever known — cannibalism. Anyone — disease carrier or not — who strayed to another village was eaten. Social intercourse was reduced to a minimum. If an epidemic broke out in a locality, everyone either died or recovered. The disease did not spread from village to village or island to island as it does today.

In general, there are three types of native treatment: surgery, cautery and massage. Various charms of one kind or another are also extensively used against disease. Conversations with many of the older members of the population indicated that herbal medicines have never been employed, except for the oil of the coconut, which was, and still is, used as a purgative. Its properties are closely similar to those of castor oil. It is obtained by squeezing copra — the dried meat of the ripe coconut.

Every year a great many natives die of pneumonia, owing to the practice of treating a fever by sitting for hours immersed to the neck in cold sea water. In spite of crowded conditions and the centuries-old threat of overpopulation, there is little intestinal disease, owing to the strictly enforced custom of depositing human waste in the sea.

Cauterization of the skin is accomplished by the application of the glowing end of a smouldering torch, made of strips of rags or bark rolled into a cylinder half an inch in diameter. It is applied for about a second. In treating a disorder, the cautery is rarely applied to the actual area of pain, but usually at points above and below it. In abdominal pains, the application is made in a circle, using the umbilicus as a center.

Massage takes the form of pressing, pinching, manipulation, friction and rubbing, but the skill of the natives in this area does not approach that of the Samoans. Massage is principally used to strengthen weakened or stiffened muscles.

Fractures are bathed in hot water and wooden splints are applied. Massage is begun early.

An injured eye is treated with the steam coming from a coconut shell half filled with water into which heated pebbles have been dropped. Another method is for the doctor to lick the eyeball with the tip of his tongue.

Throughout this part of the world, before the advent of the white man's trading schooner, cutting implements were obtained, of necessity, from whatever materials were locally available. Obsidian, which can be fashioned into knives, axes and arrowheads, is found on some of the volcanic islands. Bamboo has a sufficiently keen edge, when split, to perform such minor operations as circumcision, which is only a dorsal slit. Formerly a sharp-edged shell was often used, but now a favorite instrument is an old safety-razor blade.

On the true coral atolls, which make up the Gilbert and Ellice Islands, bamboo does not grow and there are no volcanic stones, all sand, stone and soil being of coral origin. On some of these islands, it is said that the umbilical cord was usually cut with a sliver of bamboo found on the beach, which had drifted in from the sea. Scrapers and axes are made from fragments of shells or the carapace of turtles, but this kind of material is useless for surgery. For this purpose, the razor-edged teeth of sharks are used. Excellent lancets are made by binding a tooth to a wooden handle 10 inches long and of the diameter of a fountain pen. A number of these teeth lashed to a club make an effective weapon that has been used by these warlike people for centuries.

When a shark is caught, the jaws are removed and dried in the sun. The teeth become loosened when soaked in fresh water, after which they are extracted and kept in a small coconut-fiber bag until needed. The teeth from the upper jaw have a saw-toothed edge and are used in making long incisions, whereas the smooth-edged ones from the lower jaw are used for puncturing the skin, as in bloodletting. The lances are called *ponga*. In use, the lance is held in the left hand so that the point of the tooth is over the spot to be punctured, and the point is driven in by tapping the handle with a mallet ten inches long held in the right hand. Long incisions are made by holding the lance at such an angle that when it is tapped only the front edge of the tooth cuts. The blade is then moved forward and the procedure repeated, the result being a clean incision. This kind of incision is used for removing lipomas, tuberculous lymph nodes, leperous tissue, elephantoid scrotums and the like.

In removing a subcutaneous tumor, such as a lipoma or enlarged tuberculous node of the neck, an assistant, holding a rectangular piece of turtle carapace in each hand, presses downward and inward on either side of the mass so that it is compressed and raised above the surrounding parts. The in

*During 1940 and 1941, Dr. Dillon spent eighteen months with an expedition exploring the lesser-known island groups of the Pacific.

cision is made straight across the top of the tumor in the manner described above, and the distended skin falls apart, exposing the tumor. Owing to compression, there is little bleeding until the pieces of turtle shell are removed, when the assistant attempts to remove the blood by blowing. The tumor is drawn out of the wound by a pearl-shell fishhook or a forklike piece of wood while the surgeon frees it from the underlying tissues. The wound is usually covered with soft strips of beaten coconut husk, bound in place with strips of pandanus leaf, such as are used in making mats. The skin edges are held in apposition by pressure, no sutures being employed.

This method is employed to remove the painful sores of yaws on the soles of the feet, which occur principally in the young. They are completely excised. In the Solomon Islands, this is accomplished by thoroughly scraping out the affected tissue with the fingernail.

In the Southwest Pacific the incidence of yaws is almost 100 per cent, and that of filariasis is extremely high. The crude surgery described above is often used to remove large scrotums found when elephantiasis develops, the hypertrophied tissue being excised after the testicles have been pushed back with the fingertips.

A *ponga* with a long, thick tooth is used for the removal of hydrocele fluid and for bloodletting. In puncturing the scrotum, injury to the testicles is avoided by holding it so that the liquid distends the bottom of the sac, at which point it is incised. In the Tonga Islands, hydrocele is sometimes drained by using a piece of hollow bone from a cooked bird as a cannula.

For bloodletting, the point of the instrument is driven into a distended vein on the anterior surface of the arm. Just what the native indications for venesection are I was unable to determine.

For opening boils or filarial abscesses, a moderately broad tooth with a smooth edge is used. This is done by driving the blade into the abscess with a single sharp blow. At sea, in a small sailing vessel, boils are a frequent affliction. I made use of this rather crude native instrument, after sterilization by boiling, and found it very effective and as painless as any method I know of.

One instrument, with a small, fine-pointed tooth, is used to make small puncture wounds over gumboils, swollen areas and bruises. In the case of headache or muscle ache, the needlelike point is gradually moved over the whole area of pain while the lance is tapped rapidly and lightly.

In the New Guinea area, I was amazed to hear that the tribal doctor, to cure a headache, shot the patient in the head with a bow and arrow. Investigation revealed that the bow was a miniature one with just enough force to cause a needlelike arrow to draw a tiny drop of blood. A number of these small punctures were made over the aching area. The end result was essentially the same as in the Gilberts.

As throughout most of the Pacific area, there is no objection to autopsies. The natives often do post-mortem examinations on their close relatives when there is doubt as to the cause of death.

The midwives are respected members of the community and receive payment in the form of food and fine mats for their services. Because of this there is considerable incentive for them to become as skillful as possible. A midwife is visited at about the fifth or sixth month of pregnancy, at which time massage of the abdomen, consisting of a clockwise motion over the uterus, is given twice weekly. This is supposedly done to turn the fetus and assure correct presentation, but there is probably also the intention of producing abortion. This latter is attempted by massage with heavy pressure on the abdomen and by having the patient lie with a heavy stone resting on the abdomen. Another method is to strike the back just below the kidney region with the side of the hand. These methods are quite inefficient, as indicated by the large number of illegitimate children and by the prevalence of widespread infanticide in former times. In some of the islands there were rumors that abortion was produced by potions made from various herbs, but further information could not be obtained. Apparently this is a modern practice, because internal medicine was probably not used in the past.

Superstition plays a large part in the routine of the pregnant woman. She cannot eat while walking on the road for fear the child will beg. She cannot chew the doubled-bodied pandanus fruit for fear of giving birth to twins, and she is not allowed to cut her food with a knife for fear the child will have a harelip.

The midwife is sent for when labor pains begin. The patient takes her place on a bed of mats prepared especially for the occasion. The position adopted during delivery differs among the various localities, the most frequent being the supine one, with the legs bent at the knees. Another is much the same as Sims's position. Often, however, the patient simple squats. The abdomen is massaged, and after the placenta has come away, the cord is tied with a strip of leaf of the pandanus plant. It was formerly severed with the sharp edge of a clamshell. The orifice of the vagina is smeared with oil and covered with breadfruit leaves, held in place by a T belt of plaited fibers. This pad is removed and a new coating of oil is applied as often as necessary. The placenta is usually buried, with a coconut planted over it.

If the infant does not begin to breathe spontaneously, both the nose and mouth are sucked to remove mucus, and air is blown into the ears and nostrils. Before the cord is cut the placenta is placed in a vessel of hot water and mouthfuls of cold water are squirted over the infant's face.

For the rare cases of puerperal infection, the treatment is massage of the abdomen. This seems to be the usual treatment throughout the Pacific. Once on a visit to lonely Pitcairn, I was told of a patient who had died a few days previously, and was asked how treatment could have been improved. The mother, after giving birth to twins, had had her uterus washed out with an unsterilized fountain syringe from which a large part of the population had recently received enemas. The resulting infection was vigorously treated by massage.

Until the breast supply of milk becomes available, the newborn is given coconut milk, which appears to be adequate. The child is fed at the breast so long as the supply lasts, usually about eighteen months. When the breast becomes unavailable, he is fed the soft, almost jellylike meat in the interior of the young coconut, beautifully carved spoons of mother-of-pearl being used.

I always enjoyed watching a baby being bathed. This was accomplished very simply by the mother's holding the infant up in front of her and squirting mouthfuls of water on it.

At Tarawa was the medical center of the Gilberts. Dr. K. R. Steenson had a small hospital consisting of sixteen individual huts. Unassisted, he was trying to look after the health of 45,000 people living on hundreds of tiny atolls spread over a thousand miles of water. He is well trained and well read and a dynamo of energy. Because of the war no new supplies had reached him for a long time and he was using coconut fiber as a suture material. I saw several cases in which this had been used, and the results were excellent. Dr. Steenson is now a prisoner of the Japanese.

I should like in closing to pay tribute to the hard-working physicians of the remote islands of the Pacific. Not once did we run across the "beach-comber doctor" so universal in fiction and the theater. All were able, kind, well trained and doing splendid work against great odds.

A SIMPLIFIED METHOD FOR CULTURING FUNGI FROM THE SCALP*

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LIVINGOOD and Pillsbury[1] state, after reviewing the recent American literature, "Ringworm of the scalp cannot be intelligently treated without cultural diagnostic methods." Although it is generally easy to distinguish microsporosis, trichophytosis and favus from each other by microscopic examination, the statement quoted seems correct, since it may be difficult clinically to distinguish tinea capitis infections with *Trichophyton gypseum* (*mentagrophytes*) from infections with a Microsporum. Furthermore, it is impossible to decide clinically whether *Microsporum audouini*, *M. canis* (*lanosum*) or *M. gypseum* (*M. fulvum*) is involved. Cultural diagnostic methods permit the differentiation of the four species mentioned, which is important particularly for *M. canis* and *M. audouini*. These fungi are nearly exclusively the causative agents of tinea capitis in this country. Infections with *M. canis* do not require x-ray treatment, and the search for the ultimate source of infection must be directed to an animal. If *M. audouini* is found to be the causative agent, the patient's classmates and playmates should be examined under a Wood's light; x-ray depilation seems indicated for children too young to expect pubertal changes soon, and not improved after four weeks of less energetic treatment.

Cultural diagnostic methods would probably be used more frequently if they were available at low cost and without special equipment. The present paper reports a method that can be readily performed with little expense at the physician's office and permits the differentiation of the microsporum fungi from each other and from *T. gypseum*.

The most practical formula for the culture medium was found to be as follows:

Rice	5 cc.
Water	25 cc.
Aqueous 1:10,000 solution of gentian violet‡	0.8 cc.

The only equipment required consists of a saucepan, 100-cc. or 125-cc. bottles, a 1-cc. pipette or syringe, test tubes, a platinum loop or needle and a microscope.

For the preparation of the medium a test tube marked at the 5-cc. level and another at the 25-cc. level serve as measures. The 1:10,000 gentian-violet solution is made up by adding 1 cc. of a 1 per cent alcoholic or aqueous solution to 99 cc. of water. The rice is placed in a bottle of 100-cc. capacity and is washed with water, which is changed three times after thorough shaking. The exact amount of water and the gentian-violet solution are then added. The bottles are plugged with nonabsorbent cotton and are heated in boiling water for thirty

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‡The gentian violet used in these experiments was a brand called Pyoctanin, manufactured by Merck and Company, Incorporated, Rahway, New Jersey.

minutes on three successive days, care being taken that the cotton plugs do not become wet except by steam. On the third day, after the bottles have been cooled to room temperature, they are ready for inoculation.

Fungi are usually isolated by inoculating the surface of a slanted medium at three to five points 1 cm. or more distant from one another. The gentian violet-rice medium should be inoculated only at the center of the surface, using several bottles. The material for culture is best collected under a Wood's light. Small cuts of the intradermal portion of hair stumps are used for the inoculation. The inoculated bottles are kept at room temperature.

The search for a medium was influenced by Conant's[2] extensive work on rice. This was chosen as a medium because it is available everywhere and does not undergo seasonal changes, as do potatoes. Rice was used instead of starch or flour because these materials are not so easily washed and may be unsuitable for cultures because of adulteration, bleaching or the addition of preservatives. Numerous samples of rice were tried, including long-grain and partially hulled (brown) rice. Only one kind of rice was encountered on which *M. audouini* did not grow unless the rice was washed. *M. canis* grew on all samples without previous washing. Slight changes in the proportion of water and rice did not

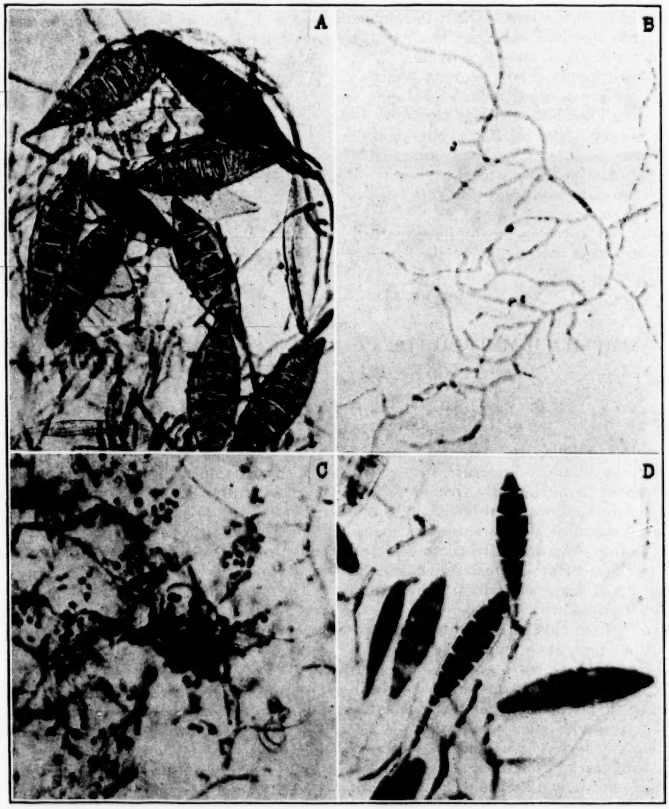

FIGURE 1. *Fresh Preparations from Colonies on Gentian-Violet Rice Medium (stained with 0.5 per cent cotton blue in lactophenol).*

A, Microsporum canis (*seven-day culture*); B, M. audouini (*fourteen-day culture*); C, Trichophyton gypseum (*eight-day culture*); *and* D, M. gypseum (*seven-day culture*).

appreciably alter the character of the colony or the rate of growth of either fungus. A high percentage of water was used to keep the medium fit for inoculation for more than a month. Ordinary medicine bottles withstood the flaming of their mouths without cracking.

The addition of gentian violet to the medium is necessary to permit simplified sterilization. In a small series of experiments some bottles were found to be contaminated when gentian violet was omitted, but in more than one hundred sets of sterilizations the medium containing gentian violet remained sterile.

The primary colony of *M. canis* appears on gentian-violet rice in a few days. It is covered by aerial hyphae forming a white, cottony growth. The base of the colony soon becomes yellowish. After the colony has grown for a few days, microscopic examination reveals numerous, thick-walled spindle spores (fuseaux) with pointed ends containing when fully developed five to twelve well-defined compartments. The outside of these spores is covered with small excrescences (Fig. 1*A*).

First cultures of *M. audouini* become visible after two weeks. They lack aerial growth. The colony is characterized by a slightly brownish discoloration spreading at the rate of about 1 cm. a week over the entire surface and throughout the medium. Daylight shows the discoloration earlier than does artificial light. Microscopic examination of smears from the discolored area shows delicate, curved and branched mycelial threads but never spindle spores (Fig. 1*B*). Comblike formations, racquet mycelia and single chlamydospores are occasionally found.

Colonies of *M. gypseum* develop a white, cottony aerial growth. The central area of their surface soon turns to light cinnamon. Microscopically numerous spindle spores with four to six compartments are found (Fig. 1*D*).

The early colonies of *T. gypseum* are covered with a white, cottony, felty or powdery growth. After a few days of growth, microscopic examination reveals innumerable spherical or ovoid microconidia, spores about 2 microns in diameter. During the second week spirals may also be seen (Fig. 1*C*).

The primary colony of *Achorion schoenleini* fails to develop aerial mycelium. It is differentiated from that of *M. audouini* by its yellow or orange color and its slower spread, which scarcely exceeds 1 mm. a week (subcultures grow more rapidly). Microscopically, large chlamydospores are seen in colonies a few days old.

Fourteen strains of *M. canis* were isolated on gentian-violet rice. One isolation failed at the first attempt because of a greenish contaminant, which also developed on Sabouraud medium. Hair stumps from the same material were covered with 90 per cent alcohol and inoculated after its evaporation; pure cultures then developed on each medium.

Seven strains of *M. audouini* developed on the first attempt on gentian-violet rice. There were enough hair stumps left of most samples to repeat the cultures equally successfully after weeks or even months.

In some cases hair stumps from diagnosed cases were used for culture after the patients had received topical medication. In one of these cases *M. audouini* failed to grow on either gentian-violet rice or Sabouraud medium. Fungicides were supposed to be responsible for this failure. One strain of *M. canis* from a treated patient failed to grow on Sabouraud medium but developed on gentian-violet rice.

The reported experiments show isolation of the fungi usually responsible for tinea capitis to be as successful on gentian-violet rice as on Sabouraud medium. Their features differ widely enough on the former to distinguish them from each other. These statements seem conclusive at least for *M. canis* and *M. audouini*, since fourteen and seven strains of these fungi, respectively, were isolated, numbers not exceeded in the reports of authoritative authors[2,3] when testing a new or modified culture medium. Other species of Microsporum are rarities in this country. If encountered, they may be identified with the help of Conant's[2] taxonomic study on a polished-rice medium.

The disadvantage of the gentian-violet rice is that Sabouraud medium frequently permits a diagnosis of *M. audouini* at an earlier date. Its advantage lies in its availability without the use of an autoclave, the saving of agar and other ingredients scarcer and more expensive than rice, and its adaptability as an office method for physicians who do not wish to use the services of a mycologist.

Summary

A cultural diagnostic method is described that permits the identification of ringworm fungi of the scalp, particularly species of Microsporum, at low cost, without agar and without special apparatus. Fourteen strains of *M. canis* and seven of *M. audouini* were isolated and identified by this method, with checking by cultures on Sabouraud medium.

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MEDICAL PROGRESS

INDUSTRIAL HYGIENE IN 1944

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AS in all other fields of knowledge, progress and development in industrial hygiene have been profoundly influenced by the war. This is especially true of industrial medicine, since it is second only to military medicine in its contribution to the war effort. While the laboratory continues to add its sum of knowledge, a wealth of clinical data on some of the older obscure and newer specific occupational diseases has been accumulated within the last year.

Our greatly increased industrial populations have benefited from the consultative services of the federal, state and local industrial-hygiene organizations, which now number half a hundred. The states have continued to expand their industrial-hygiene units, and although personnel is still limited, the volume of work has grown enormously. Existing industrial medical departments have expanded and many establishments have initiated this important service. Unions have become interested, and at least one large one retains a medical staff and has written clauses on health and safety into its contracts.[1]

REHABILITATION

At the outset of the war, a major problem of industry was to find a proper place for the handicapped worker — those with one eye or with an orthopedic defect, the deaf, the young and the very old, and others who under normal conditions could not compete in the labor market. Industry learned a great deal and did a magnificent job in placing these persons.[2] The emphasis is now changing, and the knowledge gathered during this period will have to be transposed to the absorption into industry of many veterans with physical and mental handicaps. Industry is well aware of the approaching problem, and its preoccupation with it is indicated by the number of articles published on rehabilitation, especially the plans that various industrial organizations have proposed regarding the reassimilation of its former employees and other veterans into peacetime production. All such programs visualize a medical preplacement examination in which the physician will not only evaluate the worker's disability, but will also be aware of the implications of the job for which the applicant may be fitted. Classification of disabilities and job-analysis codes have been worked out. Use of these guides will greatly facilitate evaluation of a worker's defects and the physical demands made on him by the job. This involves, of course, an intimate knowledge of the jobs available and a proper scheme for follow-up to determine the success of such placements. Many organizations are interested, the chief one being the Office of Vocational Rehabilitation of the Federal Security Agency, with branches in every state of the Union. These offices are concerned not only with the proper placement of persons, but also with retraining and vocational guidance of those having orthopedic, sensory or mental defects.[3-8]

Provision of adequate medical service to the small industrial plant has long been appreciated as a problem of major importance. The community-health nurses have now started in some areas to provide part-time nursing service to the small plant, and it is hoped that they may be trail blazers in the development of a sound program of part-time medical care for the great number of workers employed in such establishments. The important part that the general practitioner plays in the industrial medical scheme has been defined, and the inter-relation between sound industrial practice and good private practice has been stressed. The education of men qualified to specialize in industrial practice is coming to the fore, and numerous schools are developing programs for undergraduate and postgraduate work in the fields that industrial medical practice entails.[9,10] A fellowship has recently been established in connection with the Industrial Hygiene Foundation at the University of Pittsburgh, and a school of industrial health is being developed at the Wayne University College of Medicine; the latter will confine itself to teaching and research problems.

The public-health aspects of industrial hygiene have continued to receive attention. This is especially true of tuberculosis surveys, which both federal and state agencies are actively promoting among industrial workers.

ALUMINUM THERAPY FOR SILICOSIS

In 1937, Denny, Robson and Irwin[11] published some observations on the effect of finely powdered metallic aluminum in the prevention of silicosis. At about the same time, Gardner and his associates[12] at the Saranac Laboratory, working independently and unaware of the work of the Canadian group, had been conducting similar experiments, using one of the hydroxides of aluminum. Since that time a

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number of experimental and clinical investigations have been in progress, and the concept has been enlarged from that of using aluminum to prevent silicosis to its use for the treatment of silicotic patients.

The first problem was to establish the harmlessness of aluminum. Although some doubt had been cast on this by German investigators, who described a pneumoconiosis due to aluminum,[12,13] these observations have never been confirmed and it is now generally accepted that aluminum, at least in the amounts used for such treatment, does not produce harmful effects. A recent report, however, describes attacks of bronchial asthma due to an allergic sensitivity to aluminum dust.[14] Hannon,[15] using the powdered metallic aluminum, found that in a series of 143 men with silicosis and disability, 135 were improved, 2 made worse, and 6 unimproved. In another group with positive x-ray findings but no disability, 93 out of 104 improved. Another group of 185 were treated prophylactically, and at the time of writing had not developed any signs or symptoms of silicosis. Gardner and his co-workers treated a limited number of cases, using gelatinous alumina, a material that appears to have the advantages of being more stable, as effective and easier to apply. The treatment consists of daily inhalations of freshly powdered metallic aluminum or of the gelatinous alumina, first for five minutes and ultimately for thirty minutes each day. Between two and three hundred treatments are given, depending on the patient's response.

The work of both groups of investigators has demonstrated that aluminum or alumina, when introduced into the animal body, will prevent silicosis provided the irritant (quartz) and the inhibitor (aluminum) ultimately localize in the same phagocytic cells. Injection of aluminum or alumina prevents further enlargement of fibrous silicotic nodules and causes the resolution of immature silicotic tissue. The animals injected with aluminum remain apparently healthy, and susceptibility to tuberculous infection is not increased by the small amounts that are adequate to protect against silica. It seems inevitable that, with the publication of these results of many years of careful investigation, widespread clinical application will occur. It must be remembered, however, that aluminum therapy should be used only under close medical supervision and that the chief method of prevention should still be control of atmospheric dust by engineering methods.[16–18]

Pneumoconiosis

A silica hazard has appeared in the cutting and grinding of quartz crystals for use in radio transmission.[19] The manufacture of these crystals is relatively new and undergoing constant change, but the health hazard can be effectively controlled by adequate renewal of the recirculated liquid used for cooling the diamond-edged saw. Tripoli, which is 98 per cent quartz and produces in experimental animals the typical proliferative silicotic reaction, does not frequently cause human silicosis, although many workers are exposed. This is due to physical properties that prevent its being dispersed in the air as a dust.[20]

Asbestosis is usually not thought of as a predisposing cause of tuberculosis. Two recent reviews describe cases of pulmonary tuberculosis and asbestosis[21,22]; these findings, however, may be coincidental. Although it is true that the series is limited, the finding of an increasing incidence of pulmonary carcinoma in persons suffering with asbestosis seems too significant to be overlooked.[23,24] The role of pulmonary allergy in industrial occupations has been examined. Occupational groups most frequently affected by respiratory allergy are laboratory workers, food handlers, jewelers, cosmeticians, pharmacists, chemists and furriers. Treatment consists of removal from the environment, and in some cases, desensitization.[25,26]

A series of cases of a chronic pneumonitis characterized by dyspnea, orthopnea and miliary nodulation of the lungs by x-ray study and autopsy is under investigation in Massachusetts. The syndrome has developed in workers employed in a factory making electric lamps. Autopsy of one case brought to light a condition described as "sarcoid," but the usual findings of the Besnier–Boeck's syndrome were not present. The etiologic agent has not as yet been identified, but work continues actively on this phase.

Experiments with silica and feldspar dust on the susceptibility of experimental animals (rats) to lobar pneumonia resulted in lower case rates in the dust-exposed rats than in the controls.[27]

Welding

Welding has become the most important and most widely used method of joining metals, and a great number of people are now employed in this occupation. Experience has created a better understanding of some of the hazards associated with its use, and certain theoretical hazards have been disproved by clinical observation. The oft-repeated rumor that welding arcs give off x-rays has no substantiation. Radiant energy in the form of ultraviolet and some infrared rays is the only hazard of this general type. Flash keratoconjunctivitis from the ultraviolet rays constitutes one of the most frequent disabling accidents in welding,[28,29] but these lesions can be easily prevented by proper safety education. Treatment consists of the use of dark glasses, cold applications to the eyes and local anesthetic, vasoconstrictor and mydriatic lubricating and sedative preparations. Infrared rays are not effective in the management of these lesions.[30]

The most noteworthy hazard in welding has been recognized to be the pulmonary irritation caused by fumes created by the volatilization of the welded metals. Metal-fume fever has been repeatedly described. There is no clinical evidence that any sequelae dangerous to health develop from this condition. Many workers exposed only to iron oxide have developed a pigmentation of the lung (siderosis), which apparently produces no disability or any increased susceptibility to tuberculosis or other infections, although the presence of iron oxide in the lung has been reported by at least one observer to be responsible for reactivation of tuberculous lesions and for progression of active lesions.[31] This pigmentation of the lung has been likened to a tattoo of the skin. Many welders, however, do complain of some upper respiratory irritation characterized by a metallic taste, cough and, occasionally, blood-streaked sputum. These symptoms are related to the traumatic effect of the inhaled dense fumes of iron oxide and to the smoke of the organic materials coating the welding rods. This problem of siderosis is coming to the attention of physicians because of the increased amount of welding, and it should be borne in mind that differential diagnosis between this condition, which is entirely harmless, and acute miliary tuberculosis, fungus infections, metastatic carcinoma and silicosis is sometimes extremely difficult and must depend on the history and physical findings of the case.[32]

The welding of metals other than steel or iron may produce symptoms. Recent reports, including one of 5 cases, with one death,[33] have reemphasized the dangers from welding cadmium-plated steel. The mortality rate of metallic cadmium poisoning is estimated at 15 per cent, and the clinical picture is similar to that from exposure to the oxides of nitrogen or phosgene. Symptoms, usually delayed, may start in four to eight hours after exposure, with irritation of the throat, followed by cough and headache, and from twenty to thirty-six hours after exposure the patient may develop symptoms suggestive of pulmonary edema. Volatilization by the electric arc of other metals used as an alloy or surface coating may produce exposure to lead, manganese or chromium, but except for lead, there is litle danger of occurrence of a harmful concentration.

Pulmonary disease among welders is not more frequent or severer than in the general population or in those engaged in shipbuilding occupations other than welding and having the same exposure factors.[34] There have been, in fact, reports of the healing of tuberculous infiltrates while the worker is still exposed.[34,35] Technics of providing local exhaust ventilation in welding operations have occupied the engineers, and great strides have been made in this direction. The chief problem of ventilation has been in the holds of ships. Masks with supplied air have also been designed and have some merit.[36]

Dermatitis

Dermatitis remains the single most frequent disease directly resulting from occupational exposure. New substances introduced into industry are constantly being identified as being either primary skin irritants or sensitizers. Unpolymerized resins have become increasingly important as plastics in the manufacture of airplane and other military equipment. These vary widely and can be roughly grouped as protein glues, natural-resin glues and synthetic glues. Any of this group may be a dermatitis-producing agent, with the synthetic glues outstandingly the most frequent.[37]

Another group of substances which has drawn attention is that of the antimildew compounds for textiles. Some of these are phenyl mercuric salts or other organic compounds that produce a sensitization dermatitis. In most cases the use of protective clothing prevents the worker from developing a skin lesion. In addition to the synthetic resins and fabric finishes for waterproofing, flameproofing and mildewproofing, antioxidants used in rubber manufacture may also be responsible for the production of a dermatitis. For instance, the monobenzyl ether of hydroquinone used in this fashion often produces a leukoderma.[38]

The cutting oils still remain a problem. Sterilization of the oil and the introduction of antiseptics will not prevent a rash; cleanliness and minimal contact with the oil are of first importance in controlling oil folliculitis. Many of these oils have been shown to contain chlorinated compounds and hence may produce a typical chloracne. Occupational acne may also be caused by crude petroleum, coal tar and the chlorinated naphthalenes, diphenyls and benzols. Preventive measures are available, but with the chlorinated naphthalenes, and diphenyls which are used as insulation materials, these have not been entirely efficacious.[39–41]

The role of patch tests in occupational dermatitis has been reviewed by Downing[42] and Schwartz.[43] The most comprehensive article is by Schwartz, who points out that patch testing with industrial materials demands careful attention and precise knowledge, and even then a whole gamut of errors is possible. A negative result does not rule out the tested substance as a causative agent, since it is impossible to duplicate actual working conditions by this test. Criteria for the diagnosis of occupational dermatoses have been established, however, and the methods of control that have been devised are adequate if applied properly and in time.

Lead and Radium

Experimental studies in the toxicity of lead have demonstrated that a number of lead-containing substances finding increasing industrial use are soluble in tissue fluids. Lead borosilicates used for ceramics and for glass bushings are potentially toxic

for this reason.[44] Various compositions of solders containing lead have been fed to rats without producing poisoning; these compounds, nevertheless, may be toxic to human beings.[45,46] The hazard in shipyards from handling and burning lead-painted materials has been corroborated by a number of observers. After the last war, epidemics of lead poisoning occurred when ships were dismantled or repaired. Non-lead paints and improved methods of handling lead-painted surfaces have now been devised, and a diminution in the number of cases may be expected.[47,48]

Sodium citrate has been used in the treatment of 15 cases of lead poisoning by Letonoff and Kety,[49] who report immediate and persistent amelioration of the symptoms. There were no reactions or ill effects from the citrate, and in the majority of cases, appreciable increases in the amounts of urinary and fecal lead occurred during the therapy.

Recognition of the hazard from radium in luminous-dial painting, an operation greatly stimulated by military demands, has led to control measures designed to prevent a recurrence of the anemias and osteosarcomas that cropped up after the last war. Though no state or governmental agency has promulgated a code having the force of law, the employers in some jurisdictions, notably Massachusetts, have co-operated with the industrial-hygiene authorities to bring about admirable working conditions. In an exhaustive article, Evans[50] has reviewed the problem of radium poisoning and the methods of protection. In many dial-painting plants, as a result of his work, radon determinations of expired air are made at periodic intervals, and from this, the amount of radium stored in the body is determined.[51,52] A tenth of a microgram is considered the maximum permissible limit, and workers who reach this level of tolerance are transferred to other work or given a vacation. The English do not use breath radon analysis, possibly owing to insufficient technical facilities, but do insist that a three-month vacation from radium work be given each year to people engaged in this occupation.[53] So far, no cases of radium poisoning have been reported, and a recent survey of workers exposed from one and a half to four years has revealed no evidence of incipient radium effect.

Miscellaneous Conditions

A vast number of chemicals are used in industry, and knowledge of their toxicity is constantly undergoing revision. Health hazards in the synthetic rubber industry have been summarized.[54,55] Acrylonitrile, the most toxic substance employed, may enter the body by inhalation or absorption. Styrene, although a dermatitis-producing agent and an irritant of the upper respiratory tract, is not particularly toxic. Butadiene has been found to produce irritation of the upper respiratory tract, but there is no apparent danger in concentrations below the lower explosive limit. Trinitrotoluene (TNT), since it is being manufactured in such great quantities, still occasionally produces toxemia, but urinary tests have been developed that promise to be of assistance in early determination of hazardous exposure to this substance.[56,57]

The physiologic principles governing the action of acetone, as well as its toxicity, have been outlined in an extensive article by Haggard and others.[58] Although acetone, as used industrially, is not extremely toxic, the paper in question reviews the physiologic principles involved in the toxicology of all volatile substances. The amount of glucuronic acid excreted in the urine has been found to be a measure of absorption of certain organic compounds, such as cyclohexanone, aniline and chlorphenol, and may prove to be an early means of detecting absorption and the severity of industrial exposure to some of these compounds.[59,60] Largent and his associates[61] and others[62, 63] have studied the effect of fluoride ingestion on experimental animals, and the toxicities of monoalkyl ethylene glycol ethers to dogs and rats have been determined.

The chlorinated hydrocarbons so extensively used as solvents and degreasers still excite great interest, and Hamilton[64] has reviewed their toxic properties in a recent article. The reports of occupational injuries attributed to these substances have been summarized by Quadland.[65] The most toxic of these substances is tetrachlorethane, with several reports of fatal poisonings recorded. It may produce acute yellow atrophy, aplastic anemia and respiratory paralysis. In cases of early poisoning, a mononucleosis may be indicative of overexposure.[66, 67] Other reports stress the action of the chlorinated hydrocarbons as kidney poisons. This is especially true of carbon tetrachloride, which sometimes produces a clinical picture of toxic nephrosis.[68] Trichlorethylene, used therapeutically by inhalation, has produced ventricular tachycardia in several cases; this phenomenon may account for some of the mysterious deaths reported from industrial exposures to vapors of this and other chlorinated hydrocarbons.[69]

Otologic injuries have recently achieved some prominence, especially in shipyards, where noise is a constant hazard. The threat of deafness to many workers employed in noise-producing operations has been outlined by McCoy[70] and others.[71] Prevention is difficult, but the problem has as yet received insufficient attention. Audiometer studies of workers before, during and after employment are indicated.

Infectious disease of occupational origin is not frequent, but two types have recently been emphasized. In a study of 24 patients admitted for brucellosis to the Cook County Hospital in Chicago, only one was engaged in an occupation in which exposure might not occur; 17 were employed in packing houses, and 6 others were in contact with domestic animals.[72] Leptospirosis has long been

known to be occupational, in that miners and others frequently develop the condition as a result of contact with ground water infected with the urine of diseased rats. Fourteen such cases were recently reported in an Alabama mine,[73] and there has been an outbreak of the same disease in a New England fishery. Although carrying a grave prognosis, two of the former cases were cured with penicillin.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

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CASE 30471

PRESENTATION OF CASE

A forty-one-year-old woman, a millworker, was admitted to the hospital with dyspnea.

The patient was in good health until four months prior to admission, when she developed a cold, followed in a few days by a cough productive of small amounts of whitish sputum. There was no fever or malaise. The cough persisted, but she was able to work. About a month later she suddenly developed sharp inspiratory pain along the right costal border anteriorly and posteriorly. At the same time she noted that she was moderately dyspneic at rest. She continued to work, and her symptoms disappeared after a week. One month later, about six weeks prior to entry, dyspnea recurred and became so severe as to prevent all normal activity. At that time she was examined at a local hospital, a roentgenogram revealing a massive pneumothorax on the right, with basal effusion. The right lung was completely collapsed, and the mediastinum was displaced markedly to the left. From then until admission, she remained dyspneic and was limited to bed and chair activity. Eating aggravated the cough, and on one occasion she claimed to have coughed up about a cupful of "yellowish pus." She was unable to breathe when lying on her left side. She had lost 27 pounds during her illness.

Except for a hysterectomy eleven years previously following attempts at self-abortion, her past history was negative.

Physical examination revealed a sturdy, moderately obese woman propped up in bed, in moderate respiratory distress. The trachea was moderately deviated to the left. The chest showed diminished expansion on the right. The percussion note was about equally resonant on both sides. Tactile fremitus and breath sounds were practically absent on the right, and a few musical rales were audible in the right axilla and over the right base. The apical impulse was felt in the fifth interspace in the anterior axillary line, but there were no auscultatory abnormalities.

*On leave of absence.

The temperature, pulse and respirations were normal. The blood pressure was 130 systolic, 90 diastolic.

Examination of the blood revealed 70 per cent hemoglobin and a white-cell count of 12,200. The urine gave a + test for albumin, and the sediment contained 5 to 10 white cells per high-power field. Sputum culture on two occasions revealed beta-hemolytic streptococci.

Roentgenograms of the chest showed the right lung to be composed almost entirely of large cysts (Fig. 1). The upper lobe appeared destroyed, and numerous smaller cystic structures were present in the middle and lower lobes. The right main bronchus was visualized for a distance of 2 cm. but was not well seen beyond that point; no intrinsic lesion could be demonstrated, however. The heart and mediastinum were displaced to the left, somewhat compressing the left lung. Laminograms of the chest revealed a suggestive but indefinite shadow in the right main bronchus.

On the second hospital day the right chest was decompressed, 750 cc. of air being removed. The patient felt much relieved, but the chest signs remained unchanged. Two attempts at bronchoscopy were unsuccessful.

On the twenty-first hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. RALPH ADAMS†: The initial cough productive of small amounts of whitish sputum, without fever or malaise, indicated an attack of bronchitis. Sharp inspiratory pain a month later was a sign of pleural involvement. Its location along the anterior and posterior chest wall is typical of the referred pain of pleural irritation, it being expressed along the somatic fibers of the posterior and anterior penetrating branches of the intercostal nerves. Dyspnea even at rest implied pulmonary insufficiency, presumably from pneumothorax. The symptoms disappeared as the intrapleural air was absorbed. A pulmonary leak recurred one month later, and dyspnea was severe because of tension pneumothorax and pleural effusion. Roentgenologic examination at a local hospital furnished confirmation. The markedly displaced mediastinum and completely collapsed right lung provided an explanation of the dyspnea.

The patient remained dyspneic even in bed because of limitation of the respiratory reserve by the abnormal intrathoracic pressures. Most patients with a cough find it aggravated by eating. The coughing up of about a cupful of "yellowish pus" probably represented the raising of fluid spilled out of a previously blocked cyst. Her inability to

†Surgeon, Lahey Clinic, Boston.

breathe when lying on the left side was caused by mediastinal pressure on the already somewhat compressed and only functioning lung. It illustrates the fact that almost every patient with a critical chest condition can breathe better with the afflicted hemithorax lower than the opposite one. She had lost 27 pounds from interference with normal food intake by coughing and from the increased work of dyspneic breathing. The past history seems irrelevant.

Physical examination revealed the findings to be expected in a patient suffering from tension pneumothorax with mediastinal displacement into the opposite hemithorax.

The data of the clinical chart indicate that she was in cardiac equilibrium at bed-rest conditions and that she was free of major infection.

Laboratory examinations disclosed a mild secondary anemia and leukocytosis, which could be attributed to the diminished food intake, the chronic respiratory illness and the bronchitis. The urinary findings have no discernible significance. Proof of bronchial infection was found in the sputum culture, which on two occasions revealed beta-hemolytic streptococci.

The roentgenograms were typical of so-called "cystic disease of the lung" and failed to establish evidence of any primary bronchial obstruction.

Decompression of the right chest gave relief by removing pressure on the left lung rather than by restoring function in the right lung. With the excellent endoscopy service known to be available in this hospital, one may properly ask why two attempts at bronchoscopy were unsuccessful. The usual reasons, occasionally encountered, are cervical arthritis, a totally unco-operative patient and a receded lower jaw (best described as a "Bim Gump chin").

The diagnosis of cystic disease of the lung is obvious. The history is classic, a previously healthy patient in early middle age suddenly developing serious symptoms following a minor respiratory infection. The physical signs are those to be anticipated following rupture of one of the cysts into the pleural cavity secondary to a valve-type obstruction of its small bronchial communication by streptococcal bronchitis and associated edema. The case presentation gives a detailed description of cystic disease in the x-ray report, with a directness of terminology that is not designed to confuse one in doubt of the diagnosis.

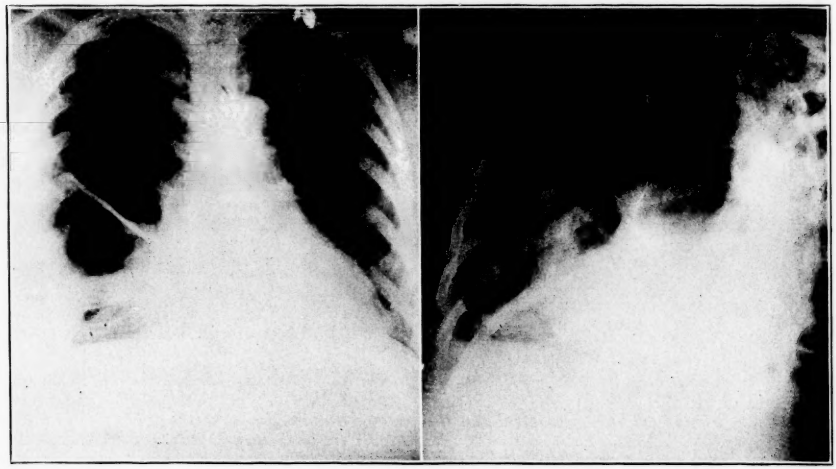

FIGURE 1. *Anteroposterior and Left Anterior Oblique Roentgenograms of Chest.*

DR. LAURENCE L. ROBBINS: The heart and mediastinum appear to be displaced a little to the left indicating that the large cystic structures on the right are under tension. In the lateral view we simply obtain more information about the number and size of these cystic cavities that appear to involve the entire right side of the chest. The Bucky film and grid film clearly demonstrate the trachea and right main bronchus. The trachea appears to bifurcate normally, and the right main bronchus can be seen for a short distance and then stops rather abruptly. The laminogram was not entirely satisfactory and does not give any more information

than can be obtained from the Bucky film, namely, a suggestion of a lesion in the right main bronchus. The left lung field appears to be normal.

DR. ADAMS: Will you put up the left anterior oblique film?

DR. ROBBINS: In this film the right main bronchus can be seen to this point.

DR. ADAMS: Your interpretation differs from the record.

DR. ROBBINS: It should not, because I gave most of the interpretation.

DR. ADAMS: The record states, "No intrinsic lesion could be demonstrated." Is that still your impression?

DR. ROBBINS: I cannot be positive that there is a lesion there, but I am suspicious because of the Bucky film and because of the fact that one can follow the right main bronchus to a point where it stops abruptly.

DR. ADAMS: Experiences at these exercises heretofore have taught me that the more apparent the diagnosis, the more carefully one should seek the unemphasized morsel of evidence (the "red herring" or, more explicitly, the "hidden slug"). I have therefore looked diligently for clues to some collateral morbid process in this case. The negative evidence is important only in the process of exclusion. The patient did not have hemoptysis, as practically always occurs at some time in some degree with bronchiogenic tumor, whether benign or malignant. By x-ray examination the primary bronchi were found open and clear. One cannot, then, properly retain bronchial adenoma or pulmonary carcinoma for causative consideration. She did not have a chronic cough productive of purulent or foul sputum, and since this is a constant concomitant of bronchopulmonary suppuration, that diagnosis also is untenable. The sputum apparently contained no tubercle bacilli; furthermore, there was no wheeze, and bronchial stricture is the only means by which tuberculosis could have led to the recorded cystic destruction. Tuberculosis is hardly worthy of inclusion in the differential discussion.

I confess, however, that I am still troubled by one point. The left anterior oblique film, taken to demonstrate the bronchi of the right lung in profile view, shows a niche in the lateral wall of the right primary bronchus, beginning 5 mm. below the carina, and itself 7 mm. in length (Fig. 1). Immediately above the niche is a curved cylinder of radiolucence 2 mm. in width and 6 mm. in length, lying in the position that a right-upper-lobe bronchus normally occupies. But it is too small for the right-upper-lobe bronchus, and too large for an artefact. Unfortunately, the laminographer did not record a section film at the proper depth to show the right bronchial tree, and bronchoscopy was not possible. One is again reminded of the frequently essential nature of bronchoscopy in establishing an accurate pulmonary diagnosis. Notice that the margin of the niche in respect to the primary bronchus is concave, as would occur with fibrosis and scar contraction, rather than convex, as would occur with a propagating tumor. The remnant of the upper-lobe bronchus is so narrow that edema, as from bronchitis, could easily prevent egress of air, and be followed by rupture of the cyst and spontaneous pneumothorax, which would initiate the clinical and physiologic history of this case.

After devoting so much time to the clinical and physiologic features, I shall briefly discuss the anatomic and pathologic features of the disease. Many forms of pulmonary cysts no doubt are acquired, as by parenchymal dilatation from hemorrhagic effusion or distention from infected secretions distal to bronchial obstruction of an inflammatory nature. Cystic bronchiectasis, statistically the most fatal form, is the prime example of this type. Emphysematous blebs lying subpleurally, with a background of asthma or pulmonary fibrosis, comprise a second acquired type. Closely similar are the huge solitary cysts that occur as late complications following the inhalation of a noxious gas. Phosgene poisoning in World War I contributed several cases to this group, one of which I treated surgically only eighteen months ago, twenty-five years after the initial injury. The majority of cysts, however, are believed to be congenital in origin. A lining membrane of ciliated epithelium is generally present, and anthracosis in the residual lung parenchyma is infrequently found, intimating lifelong failure to aerate that portion of lung. The frequency of associated bronchial and vascular abnormalities is high.

Some cysts contain viscid albuminous fluid consisting chiefly of epithelial debris, as well as air; they may empty spontaneously and then refill with air under tension. The patient coughed up a cupful of such material and called it "pus." The postnatal behavior of the congenital type is influenced by the amount and manner of bronchial communication and above all by the time and virulence of complicating infection. The disease is likely to be clinically silent until a check-valve mechanism is established in a communicating bronchus. In this patient it was silent for forty-one years.

I assume that the operation was a pneumonectomy. On the basis of a small experience with this disease, I am willing to predict that the operative and pathological examinations of the specimen showed a pulmonary artery of much smaller diameter and greater thickness of wall than normal, fibrosis and scarring of the right-upper-lobe bronchus with production of a check-valve mechanism, lower-lobe bronchial dilatation of the cystic rather than the truly bronchiectatic type, parenchymal destruction by cysts lined with either ciliated or flattened

epithelium and relative absence of carbon pigment.

In conclusion, my diagnosis is congenital cystic disease of the right lung.

DR. BENJAMIN CASTLEMAN: Dr. Drake, will you describe the operation?

DR. EMERSON H. DRAKE: Our preoperative conclusions were similar to those of Dr. Adams. We thought that the lesion in the oblique view might represent a bronchial lesion of some sort and that we might run into a right lung that was completely destroyed because of cystic disease. The patient had been rather unco-operative. She was a thick-necked, husky individual and it was impossible to pass the bronchoscope on two occasions.

On opening the chest cavity, the cystic mass obviously contained air. It was thick-walled and dense, and the two pleural layers were adherent. The cystic mass was freed with difficulty from the parietal pleura. An area of collapsed lung, which appeared to be middle lobe, was visualized, but the size of the cyst made it practically impossible to expose the hilum clearly. At one point a small tear was made in the cyst wall, following which a small amount of mucoid material exuded. We were unable to separate any normal lung tissue from the cystic mass, and the whole lung was removed en masse.

The postoperative course was uneventful. She has been seen during the past month and is asymptomatic.

CLINICAL DIAGNOSIS

Congenital cystic disease of lung.

DR. ADAMS'S DIAGNOSIS

Congenital cystic disease of lung.

ANATOMICAL DIAGNOSIS

Bronchiogenic cyst, extrapulmonary.

PATHOLOGICAL DISCUSSION

DR. CASTLEMAN: The specimen we received was a completely collapsed right lung to which was attached on its lateral and posterior portions a huge cystic structure that compressed and rotated the lung so that it lay posteriorly and medially in the chest and thus could not be identified during the operation. The mass measured 25 by 15 by 11 cm. and was attached to the surface of the lung in two places — one at the upper lobe and the other over a large area of the lower lobe (Fig. 2). The attachments over the lower lobe were dense and were exceedingly difficult to separate without tearing the lung. No bronchial communication could be demonstrated.

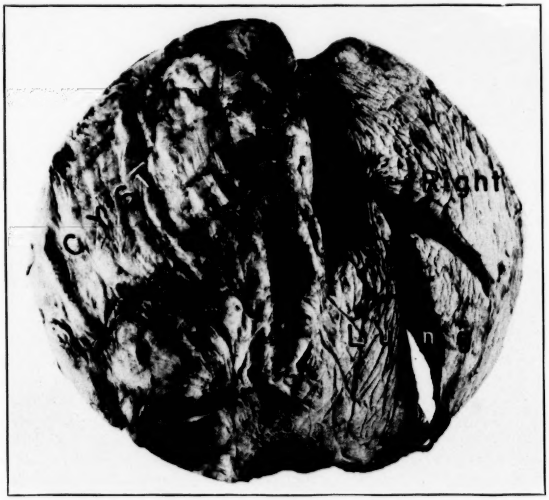

FIGURE 2. *Photograph of Cystic Mass Attached to the Right Lung.*

Section of the mass showed that it was composed of one large cavity, comprising the upper half, and a number of small cavities, occupying the lower half. The walls of the spaces were made up of dense fibrous tissue and were heavily trabeculated. Microscopically the cysts were lined by respiratory

epithelium; the walls were composed predominantly of smooth muscle with scattered foci of mucous glands and a rare group of cartilage cells. This lesion was therefore a true bronchiogenic cyst.

DR. ADAMS: What about the right-upper-lobe bronchus?

DR. CASTLEMAN: I should think that it was compressed by this cystic mass in such a way as to produce the narrowing observed in the film; we have not investigated that point, however. The lung parenchyma, except for being atelectatic, was normal.

DR. ADAMS: Do you think that it was a form of congenital cystic disease?

DR. CASTLEMAN: Yes. The usual theory of the origin of a bronchiogenic cyst is that it is the result of the pinching off of a lung bud during embryonic life. It increases in size so long as there is a communication with a bronchus. This one is the largest that we have ever seen. They are usually located in the upper mediastinum close to the bifurcation of the trachea.

CASE 30472

PRESENTATION OF CASE

A fifty-year-old man, a former credit manager, entered the hospital because of pain in the back.

The patient had been in good health until two months before admission, when he noticed gradual onset of pain low in the back. The pain gradually increased in intensity, was more or less steady and ranged from "dull to very severe." It was aggravated by coughing and sneezing and was worse when he was flat in bed, so that after a night in bed, he found it difficult to move at all. He obtained some relief by standing or walking and by taking aspirin and Empirin. Every two or three days he also noted pain in the right lower quadrant of the abdomen, which was sharp and crampy in character. With the onset of the pain in the back, the patient also developed severe constipation. Once or twice he noticed bright-red blood in the stools, which he attributed to hemorrhoids. There was considerable straining at stool. When severely constipated the abdomen became distended, but he had no nausea or vomiting. The distention and constipation were relieved by cathartics. His appetite, which had always been good, remained unchanged. He had lost 12 pounds in eight months. About four days before entry he developed edema of both ankles, but there was no dyspnea, chest pain, cough or hemoptysis.

One year before entry, repair of a recurrent inguinal hernia and an appendectomy were performed.

Physical examination showed a well-developed, well-nourished man in moderate distress. The left border of cardiac dullness was 10 cm. to the left of the midline. An apical blowing systolic murmur was heard. The lungs were clear. There was some tenderness to deep palpation in the right lower quadrant. Palpation anywhere in the abdomen caused pain in the back. Along the crest of the right ilium posteriorly there was tenderness to palpation. Rectal examination was negative except for external hemorrhoids. There was pitting edema of the ankles and feet.

The blood pressure was 145 systolic, 90 diastolic. The temperature was 98.6°F., the pulse 90, and the respirations 20.

Examination of the blood showed a red-cell count of 4,250,000, with 12.6 gm. of hemoglobin. The white-cell count was 6800, with 73 per cent neutrophils. The urine was normal. A blood Hinton test was negative. The serum protein was 7.2 gm. per 100 cc. The nonprotein nitrogen was within normal range.

Anteroposterior and lateral films of the lumbar and dorsal spine and plain films of the abdomen and chest were normal. A barium enema was not entirely satisfactory, but appeared to be essentially negative.

On the second hospital day the patient had considerable pain low in the back, and 16 mg. (¼ gr.) of morphine was given. The pain gradually subsided in the next four or five days. During that time he apparently had difficulty with urination. On the sixth hospital day he experienced numbness over the anterior aspects of both thighs and there was diminished sensation to pinprick. The ankle jerks and knee jerks were brisk and equal, and the plantar reflexes were normal. There was no marked atrophy or weakness, but the pain was so great that accurate testing was impossible. Sudden muscular contraction produced acute sharp pain. The upright position seemed to produce steady severe pain low in the back. An intravenous pyelogram showed prompt excretion of the dye by both kidneys, but the pelves and calyxes could not be visualized because the patient experienced a severe reaction, the nature of which is not described in the record. On the seventh hospital day an exploratory laparotomy revealed no abnormal findings. Postoperatively the edema disappeared completely.

On the tenth hospital day lumbar puncture between the first and second lumbar vertebras gave clear yellow fluid that clotted on standing. The initial pressure was 130 mm. of water; jugular compression caused a prompt rise of pressure to 220 mm. and a subsequent fall to 200 mm. This procedure produced considerable pain low in the back and in the abdomen. Ten cubic centimeters of fluid was removed giving a final pressure of 80 mm. The total cell count was 2 per cubic millimeter. The ammonium sulfate ring test was ++++, and the total protein 1140 mg. per 100 cc.

After lumbar puncture there was a questionable level of sensory disturbance in the right groin. On the sixteenth hospital day, lipiodol injected at the fourth interspace was arrested between the twelfth dorsal and first lumbar vertebras (Fig. 1). On the eighteenth hospital day a laminectomy was performed.

Differential Diagnosis

Dr. Samuel Lowis: There are several peculiar things in this case. Some of the difficulties even-

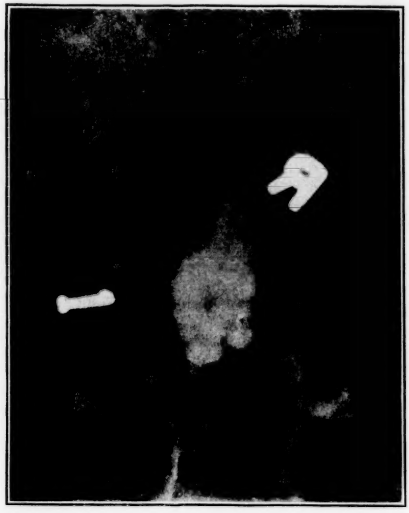

Figure 1.

tually disappeared, but some of them resulted in an operation that apparently yielded no information concerning the basic problem.

We are told that the patient was in good health until two months before admission; but he began to lose weight eight months before admission despite a normal appetite. The pain was of a type frequently seen with an intraspinal lesion in the lumbar area; that is, it was dull to severe, aggravated by coughing and sneezing, and worse when lying flat in bed. It apparently increased markedly during the time in the hospital, although that is not specifically stated; in spite of this pain, neurologic examination was negative. We are told that the patient had marked abdominal symptoms because of which pyelograms and a barium enema were done, with essentially negative results. In spite of this and without any other given information an exploratory laparotomy was performed, with no abnormal findings. Is a preoperative diagnosis available?

Dr. Charles S. Kubik: It was retroperitoneal lymphoma.

Dr. Lowis: One not infrequently sees abdominal symptoms but quite rarely abdominal signs with lumbar, intraspinal, expanding lesions once they have reached the point of compressing the structures within the spinal canal. We are told that pressure on the abdomen caused pain in the back, which is a reasonable finding in terms of a lesion that filled the spinal canal: pressure on the abdomen causes an increase in the intraspinal pressure by back pressure on the lumbar veins, and may cause a shift in the position of the tumor in relation to the nerve roots about it or an increase in the pressure of the mass on the nerve roots. We are told that the patient had urinary difficulty while he was in the hospital. This, too, may be considered to have been a sign of an intraspinal lesion, although one cannot be definite because it disappeared before treatment. We are told particularly, and this seems to me to be of interest, that the pain was rather marked, steady and crampy, and worse when he lay flat on his back, and therefore worse in the morning. This is the kind of pain that one sees not uncommonly with intraspinal lesions that have caused a considerable degree of pressure on nerve roots for a long time. Usually when this has happened there are positive neurologic findings; but their absence is not against an intraspinal lesion. We can overlook the edema: not because it is of no importance but because I can see no way to tie it in with the clinical findings in the history.

May we see the x-ray films? There is no question that there was total block. The fluid had a high protein content and clotted; and I think that we can assume there was no recent inflammation because of the low cell count. The dynamics were consistent with block, though we are told nothing about abdominal compression.

Dr. Laurence L. Robbins: In the plain films of the spine I can see nothing of significance, but the lipiodol examination apparently gives the answer. When this was injected into the subarachnoid space through a needle in the third lumbar interspinous space, it was arrested opposite the twelfth thoracic vertebra.

Dr. Lowis: The distance between the pedicles was measured, I assume, and was normal.

Dr. Robbins: Yes, and there is no apparent erosion of the pedicles.

Dr. Lowis: There is no history of injury; this is of some significance because one rarely sees a ruptured disk at that level and, when one does, there is generally a history of severe trauma to the back, usually direct. It seems to me that with a lesion in that location, which is about at the conus of the cord, and in the absence of signs referable to the cord itself, the lesion must have been

of short length, in other words, not a lesion that extended upward for any distance. The symptoms had been going on for a relatively short period of time. Although they progressed rapidly I do not believe that that necessarily implies the nature of the lesion. We must consider all the lesions usually seen at this level. Ependymoma is unlikely, because the site was above the lower end of the conus and an ependymoma is rarely seen there; when it does occur, it is intramedullary rather than extramedullary. In view of the relatively rapid progress of the disability and the absence of a history of injury the leading possibilities are meningioma and neurofibroma, in that order, with a ruptured disk a poor third.

DR. AUGUSTUS S. ROSE: This case is a good example of how "red herrings" can interfere with judgment. I saw the patient prior to the abdominal exploration, along with Dr. Richard Miller and Dr. Wyman Richardson. Dr. Lowis has properly evaluated the edema of the legs, which we failed to do. The man had predominantly abdominal symptoms, we thought, with a palpable liver and tenderness of the abdomen, together with edema that was rather more marked than is intimated by the abstract. We thought that there was a retroperitoneal mass, with obstruction of the vena cava. The patient was so difficult to examine that an accurate diagnosis was impossible. The pain was excruciating, and although the comment is made that he received 16 mg. of morphine at one time, he actually received as much as 32 mg. two or three times a day. The pain was literally everywhere below his chest, and whereas it was severer in the back, it was widely distributed. I make these statements not only to defend our course but also to emphasize the unusual features of the case. I made the great error of not doing a lumbar puncture, in spite of the negative neurologic examination. We were swayed, and abdominal exploration was performed. A lumbar puncture was done after the negative abdominal exploration, and clear-cut evidence of a dynamic and chemical block was found, so that a diagnosis was possible.

DR. JAMES B. AYER: Why did the edema disappear after the lumbar puncture?

DR. ROSE: We believed that the edema was postural. The patient could not lie down in comfort, having been forced to sit in a semiupright position or to stand for two months. With hospitalization and abdominal surgery he was forced to lie down, which gave the edema an opportunity to subside.

In retrospect it may be of interest that the onset of the man's pain, which we did not determine until after the operation, came on immediately after he tripped in coming out of a streetcar. He missed the curbstone and came down hard on the extended leg. Pain came on instantaneously and was present intermittently until the time of the operation.

DR. LOWIS: The omission of this history of injury may be significant; it might cause a change in the diagnosis.

DR. ROSE: He did not fall. He simply missed the curbstone as he stepped from the car.

CLINICAL DIAGNOSIS

Spinal tumor.

DR. LOWIS'S DIAGNOSIS

Meningioma?
Neurofibroma?

ANATOMICAL DIAGNOSIS

Neurofibroma.

PATHOLOGICAL DISCUSSION

DR. KUBIK: Dr. W. Jason Mixter performed the operation. On removing the laminas of the eleventh and twelfth thoracic vertebras he came down on a tumor lying beneath the dura and arachnoid membrane. The tumor, a neurofibroma, was 3 cm. long and 1.5 cm. in diameter.

The patient made a good recovery.

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THANKSGIVING

DESPITE the prospect, at this date, of another winter of war in Europe with the misery and the loss of life that it entails, and of still unnumbered months to come of the struggle in the Pacific, there is yet every reason why we should proclaim and celebrate our accustomed day of thanksgiving.

We can be thankful, despite the grimness of the present and of the immediate future, that we can clearly see the eventual triumph over our enemies. We can be thankful that years of soft living have made no permanent inroads on our national vitality, that our leaders and our youth have measured up to the task that has been set before them. We can be thankful, in a year of stress, when many privileges have been curtailed and many among us have yielded to the temptation of exercising undue authority, that we have held a national election and have chosen our leaders and our representatives according to the laws expressed in our constitution. We can be thankful that we have retained this freedom of speech and of action when freedoms in other parts of the world have been destroyed or are being restricted and limited by the hard hand of domineering authority. We can be thankful that we have been able to feed ourselves and others, well, if not lavishly. We can be thankful that the medical and surgical care given to our men in service is the best in the world and that those physicians who are left have strength to serve their communities ably and with faith. We can, in short, be thankful that the light of liberty still prevails and will prevail.

And what can the nation do to show its gratitude for these basic blessings that so set it apart from the rest of the world? It can continue its part as a loyal, hard-working rear echelon to its armies in battle and to its fleets that have at last secured the freedom of the seas. It can work without complaining, endure without breaking, contribute without holding back and, through the Red Cross, give its own blood in safety to make up in part for the blood that has been shed for it in mortal danger.

THE CONTROL OF WHOOPING COUGH

RELIABLE pertussis vaccine has been available in the United States since 1931.[1] Such vaccine consists of whole, killed, Phase 1 strains of *Haemophilus pertussis*. Extracts of the bacilli have not proved to be effective immunizing agents. In the near future the Massachusetts Department of Public Health expects to supply a vaccine. With this in view, it seems appropriate to clarify what can be expected of this vaccine in the control of whooping cough.

The value of whooping-cough vaccine in the prevention of this disease in nonexposed children is much less than that of vaccination against smallpox. Lapin[2] has given an excellent summary of the studies on immunization in his recent book. In the presence of definite household exposure one can expect 30 to 36 per cent of the vaccinated children to become infected, compared with 92 per cent of

the unvaccinated.[3,4] It is also generally agreed that the attacks that occur in vaccinated children are less severe than those in the unvaccinated.[2,4]

In Massachusetts from 1924 to 1943, 58 per cent of all the deaths from this disease occurred in the first year of life, and 84 per cent in the first two years. The protection of infants from exposure to whooping cough continues to be a vitally important factor in the control of this disease; the vaccine, however, is usually not effective in the first six months of life. Furthermore, reactions are likely to be severest at this early age.[5] The first injection should be given in the seventh month. The best immunity is achieved by giving three subcutaneous injections one month apart. The height of immunity is reached after three or four months. A single dose one or two years later to "boost" the immunity is a sound practice and should be encouraged. Since the incubation period of whooping cough is only about ten days, one should not expect any benefit from vaccine administered to a child after exposure to the disease, much less after the onset of symptoms.

Pertussis vaccine may be combined with diphtheria toxoid without producing untoward results following injection, but preparations also containing tetanus toxoid produce such severe reactions[2] that, at the moment, they are unsatisfactory.

Cohen and Scadron[6] injected pregnant women with *H. pertussis* vaccine with the result that a high titer of immune bodies developed in the mother and was transmitted to the baby. As pointed out by Lapin, "such antibacterial passive immunity is notoriously short-lived . . . and no clinical evidence of protection against exposure has been forthcoming." Therefore, how much actual protection from such placental transmissions of antibodies will come from this method remains to be seen.

Hyperimmune serum supplies a certain degree of temporary passive immunity, and because of this is often effective as a prophylactic measure after exposure in the first months of life. Such protection, however, does not extend beyond fourteen days. This serum is also of value in the early stages of the disease itself. Indeed, in many institutions it has become routine procedure on admission in all cases of pertussis in which the children are under two years of age.

Besides hyperimmune serum, advances in the treatment of whooping cough include the use of oxygen in cases in which repeated convulsions result from the anoxemia brought about by severe paroxysms.[7] Needless to say, oxygen will not control the repeated convulsions that are due to cerebral hemorrhage.

In a disease with such wide variations in severity, it is difficult to determine the value of the various agents that have been said to be of benefit. This is proved by the figures compiled by Stimson[8] at the Willard Parker Hospital, which showed that, with no particular change in therapy during nine years, the mortality from pertussis varied from 8.8 per cent in 1931 to 2.1 per cent in 1939. In Massachusetts, the fatality rate fell rather steadily from 2.4 per cent in 1927 to 0.4 per cent in 1942. It is to be hoped that with intelligent and wide use of a reliable vaccine even better control of whooping cough will be achieved.

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MASSACHUSETTS MEDICAL SOCIETY

DEATHS

DUDLEY — Oscar A. Dudley, M.D., of Shrewsbury, died October 28. He was in his sixty-first year.

Dr. Dudley received his degree from Tufts College Medical School in 1907. He had been the health officer of the Massachusetts Department of Public Health for the Worcester district for twenty-five years. He was decorated with the Croix de Guerre by the French government for heroism in World War I. Dr. Dudley held a commission in the Massachusetts National Guard of the United States Army for twenty-eight years, retiring in July, 1939, with the rank of colonel. He was a member of the American Medical Association and the Massachusetts Public Health Association.

His widow and two nephews survive.

MORSE — Frank L. Morse, M.D., of Somerville, died November 5. He was in his seventy-fourth year.

Dr. Morse received his degree from Harvard Medical School in 1894. He had been medical inspector in Somerville

from 1901 until his retirement in 1942. He was an intern at Boston City Hospital, where he became assistant resident physician. At the start of World War I, Dr. Morse enlisted and subsequently was assigned to the Surgeon General's Office in Washington. He went overseas as sanitary inspector of the 89th Division and served with the Army of Occupation. On his return to this country, he was commissioned in the Officers' Reserve Corps and held the rank of colonel until retirement in 1935.

His widow and two sisters survive.

NEW HAMPSHIRE MEDICAL SOCIETY

DEATH

LANDMAN — Elbert A. Landman, M.D., of Plaistow, died October 18. He was in his seventy-seventh year.

Dr. Landman received his degree from Dartmouth Medical School, Hanover, in 1899.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Health Education on the Industrial Front: The 1942 Health Education Conference of the New York Academy of Medicine. 8°, cloth, 63 pp. New York: Columbia University Press, 1943. $1.25.

This small volume is made up of the papers read before the Health Education Conference of the New York Academy of Medicine in 1942. They are of timely interest because of the vital interrelations of industry, labor, medicine and government. The following topics are discussed by various authorities: the wartime industrialization of the community and its health implications; food and nutrition in the home and in the work place; disease and handicap detection and control in industry; mental problems and morale in industry; and educational methods and control of accidents in industry.

The Four Hundredth Anniversary Celebration of the De Humani Corporis Fabrica of Andreas Vesalius. Publication No. 7, Historical Library, Yale Medical Library. 4°, cloth, 67 pp., illustrated, with frontispiece. New Haven, Connecticut: Historical Library, Yale University School of Medicine, 1943. $2.50.

This small bound pamphlet is comprised of the various papers read at the celebration of the four-hundredth anniversary of the printing of the famous anatomy of Vesalius. The papers are reprinted from the December, 1943 issue of the *Yale Journal of Biology and Medicine*, and are here brought together in a volume suitable for ready reference.

Army Surgeon. By Genevieve Fox. With illustrations by Forrest Orr. 12°, cloth, 244 pp., illustrated. Boston: Little, Brown and Company, 1944. $2.00.

In this book for children Miss Fox relates the story of Alexis St. Martin and Dr. William Beaumont. The story begins with the early life of Beaumont and continues through the period when he was studying the action of the gastric juices on his famous patient, Alexis St. Martin, and ends with the story of the travels of Dr. Beaumont and his patient to Washington and other Eastern cities, where he lectured and exhibited his patient. The book is well written in an easy style and should prove interesting to children in the teen age.

Summary of State Legislation Requiring Premarital and Prenatal Examinations for Venereal Diseases, by Aneta E. Bowden, M.A., Ph.D., and George Gould, M.A., LL.B., assistant director, Division of Legal and Protective Services, American Social Hygiene Association. Second edition, revised by George Gould. 8°, paper, 30 pp. New York City: American Social Hygiene Association, in co-operation with United States Public Health Service, 1944.

Two years having elapsed since the first edition of this pamphlet was published, it is now found necessary to issue a new edition. During this relatively short period four additional states passed premarital examination laws, four states enacted into law bills dealing with prenatal examination and many other states amended existing premarital legislation. Thirty states have laws protecting marriage by requiring examination of both bride and groom by a physician to include a blood test for syphilis, and a like number of states protect babies by requiring the physician to examine the prospective mother for syphilis as early as possible during pregnancy. This summary provides up-to-date information on all state legislation and can serve as a practical guide to all persons concerned. The California premarital law is suggested as a basis in drafting similar laws. Premarital and prenatal charts show the operation of the respective laws in every state. A new table has been added, giving the legal waiting period in relation to marriage licenses. Each state reference has been revised in accordance with information received and approved by the individual state officers. This small pamphlet is a valuable reference text for all libraries and interested persons.

The Medical Clinics of North America. Chronic Diseases. (March, 1944). 8°, cloth, 233 pp., illustrated. Philadelphia: W. B. Saunders Company, 1944. $3.00.

NOTICES

ANNOUNCEMENT

Following discharge from military service Dr. Newman Cohen has resumed the practice of neuropsychiatry at 475 Commonwealth Avenue, Boston, Massachusetts.

NEW ENGLAND PEDIATRIC SOCIETY

There will be a meeting of the New England Pediatric Society on Wednesday, November 29. The clinical presentation will be held at the Amphitheater, Pratt Diagnostic Hospital, and all other events at Longwood Towers, Brookline.

PROGRAM

4:00 p.m. Clinical presentation by the staff at the Boston Floating Hospital.
6:30 p.m. Refreshments.
7:00 p.m. Dinner.
8:00 p.m. The Factors Influencing Dental Caries in New England. Dr. Joseph Volker.

Members of the medical profession and students are cordially invited to attend the evening meeting.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING THURSDAY, NOVEMBER 30

FRIDAY, DECEMBER 1
10:50 a.m. Virus Diseases. Dr. George Morris. (Postgraduate clinic in dermatology and syphilis.) Dowling Amphitheater, Boston City Hospital.

SATURDAY, DECEMBER 2
*10:00 a.m.–12:00 m. Medical staff rounds. Peter Bent Brigham Hospital.

MONDAY, DECEMBER 4
12:00 m.–1:00 p.m. Clinicopathological conference. Peter Bent Brigham Hospital.

TUESDAY, DECEMBER 5
*12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital.

WEDNESDAY, DECEMBER 6
*12:00 m. Clinicopathological conference. Children's Hospital.

*Open to the medical profession.

(*Notices continued on page xv*)